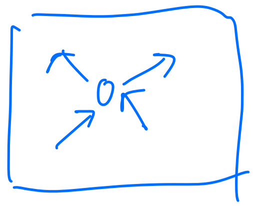
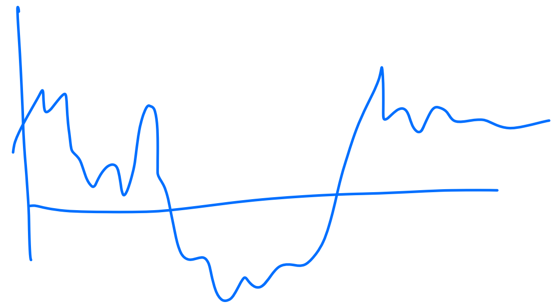
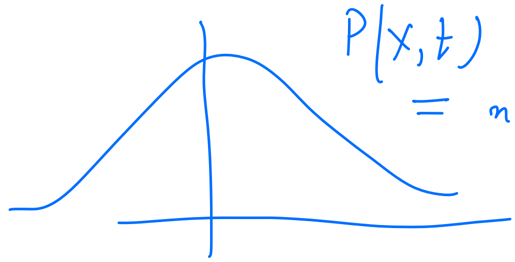






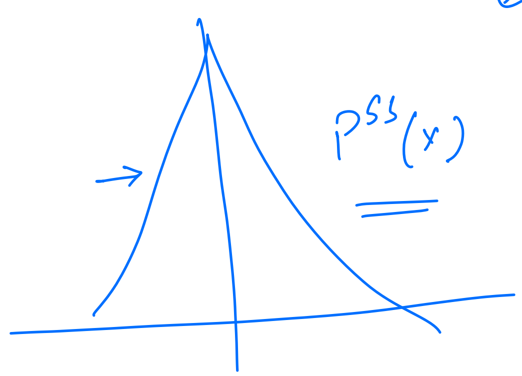
$P(x,t)$

$=$ non-eq$^{\underline{n}}$ / time-dep

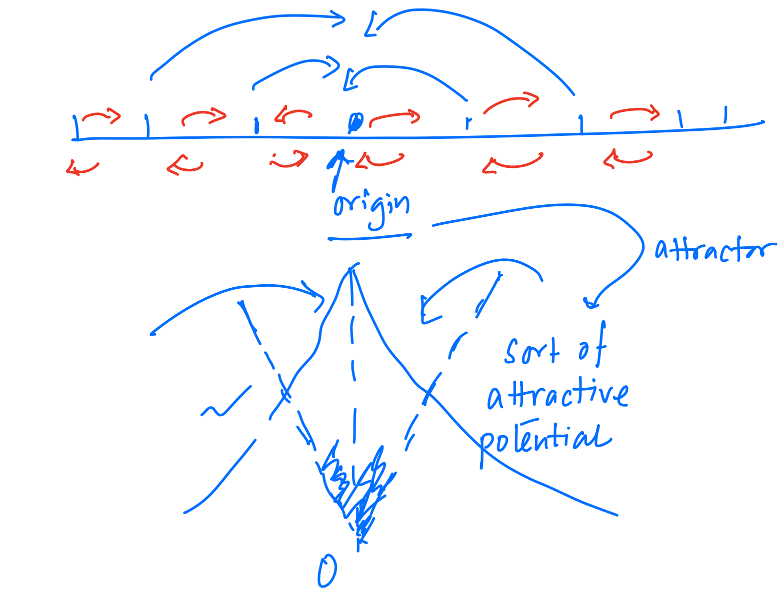
$P(x,t) \xrightarrow{\checkmark} P_{ss}(x)$

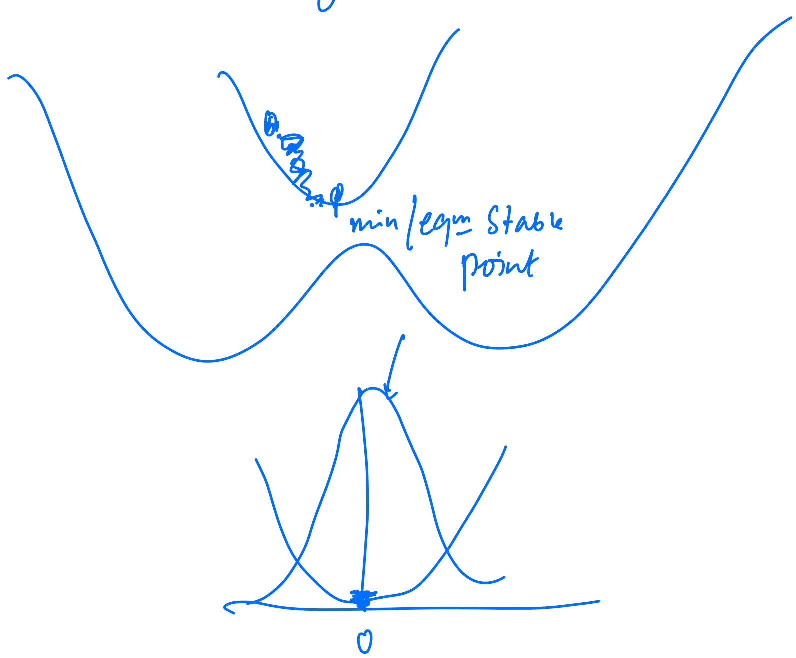
indep. of time

$\lim_{t\to\infty} >> \{\tau_i\}$



$\underline{\underline{P^{ss}(x)}}$ time-indep.


origin
attractor
sort of
attractive
potential
0

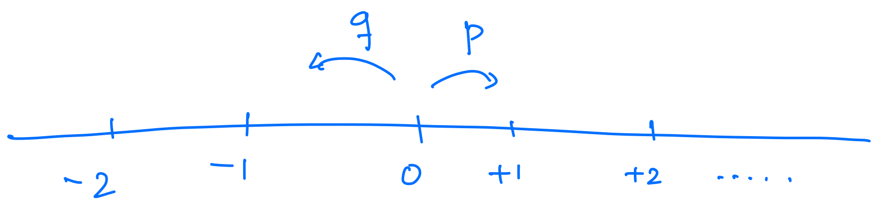

min/eqm stable
point
0

Random Walker

Before $\rightarrow$ combinatorics (counting # of paths)

$P(m,N) \rightarrow$ PDF for finding the walker at a location m after N-steps

Systematic approach :



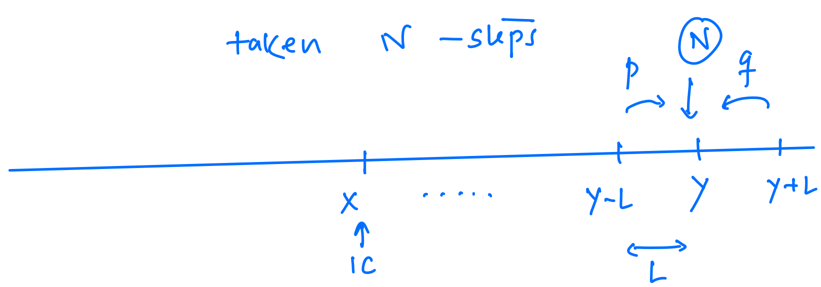
$$\begin{cases} p = \text{prob. of taking a step to the right} \\ q = \text{" " " left} \end{cases}$$

$$p+q = 1$$

$$P(N;\underset{\substack{\uparrow \\ \text{\# steps to the right}}}{n}) = p^n q^{N-n} \frac{N!}{n!(N-n)!}$$

Recursion relation:

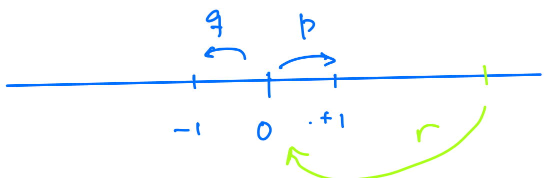
$P(N,x,y)$ = prob. that the walker has started at x & ends at y after having taken N-steps



$L=1$

$$P(N,x,y) = p\,P(N-1,x,y-L) + q\,P(N-1,x,y+L)$$

Add resetting : (try this systematic approach rather than the combinatorics)



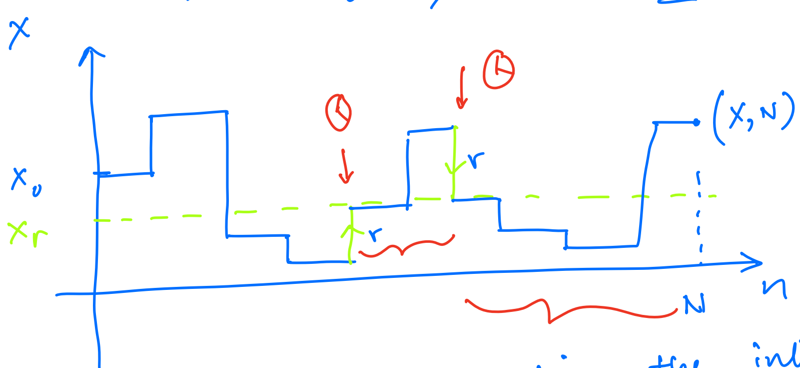
$$x_{n+1} = \begin{cases} x_r, & wp = r \\ \underline{x_n + \xi_n}; & wp = 1-r \end{cases}$$

$$p(\xi_n) = p\,\delta(\xi_n - 1) + q\,\delta(\xi_n + 1)$$

choose $x_r = 0$

$$\delta_{\xi_n,1} = \begin{cases} 1, & \xi_n = 1 \\ 0, & \text{otherwise} \end{cases}$$

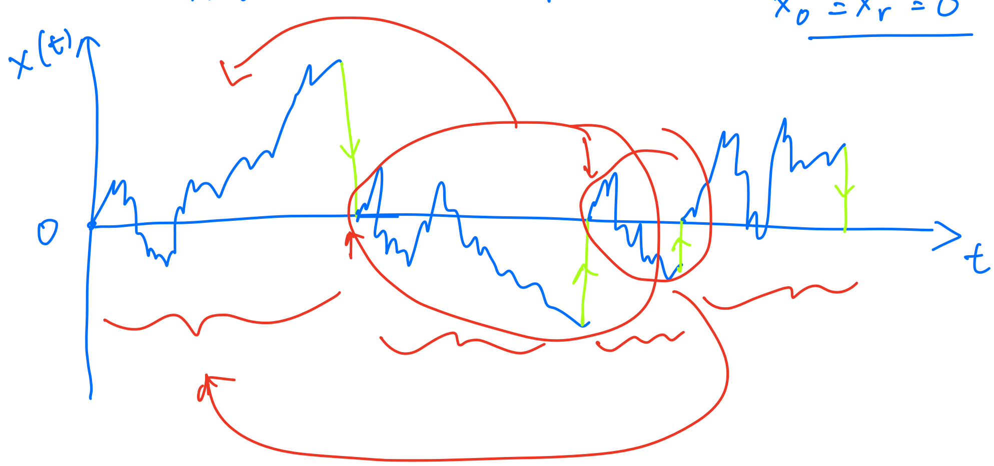
$$\xi_n = \begin{cases} +1, & wp = p \\ -1, & wp = q \end{cases}$$

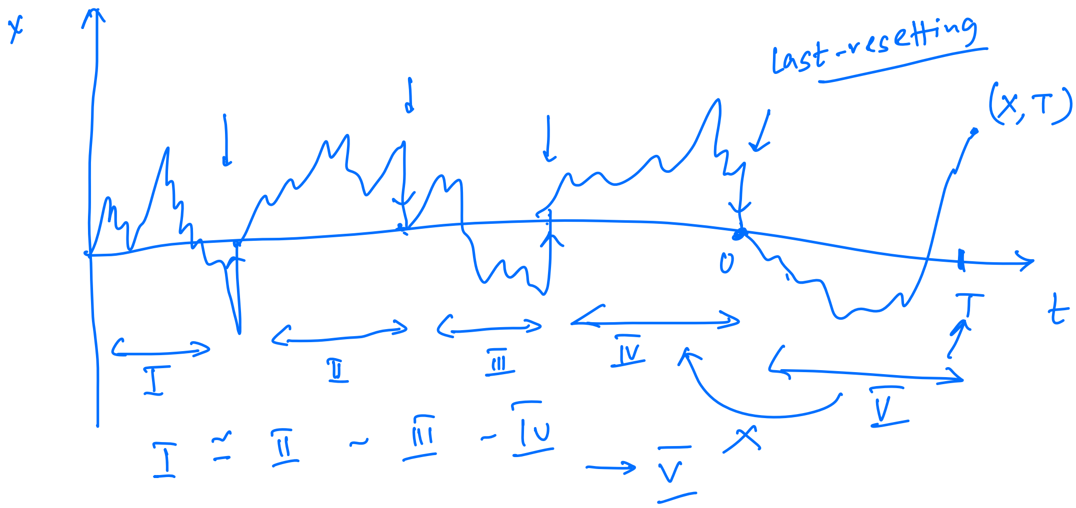


$$\begin{array}{c} x_2 \\ x_2 \\ \vdots \end{array} \Bigg\} \; P(x,N)$$

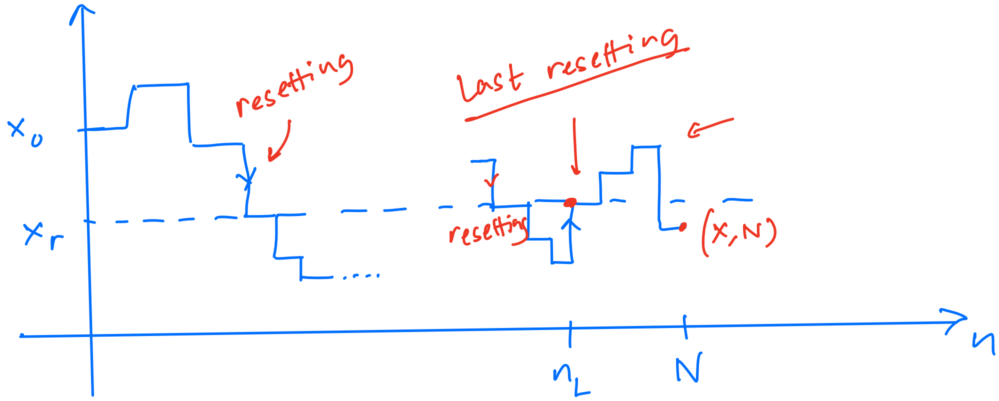
** Resetting is making the intervals b/w two resets indep.

$x_0 = x_r = 0$





To do the mathematical analysis, it's just enough to keep track of the last resetting event.



$N - n_L = m$

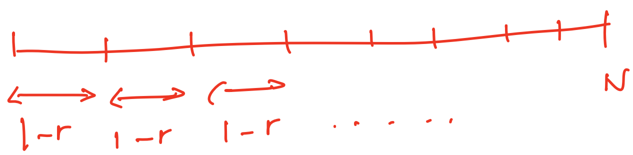
$P_r(x, N \mid x_0, 0; x_r)$ = { contribution from trajectories which did not undergo resetting } (prob. is less but finite)

+ { contribution from reset trajectories }

$$x_{n+1} = \begin{cases} x_r \,, & \text{wp} = r \\ x_n + \xi_n \,; & \text{wp} = 1-r \end{cases}$$

prob. of having a resetting jump $= r$

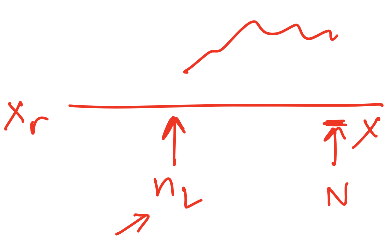
prob. of not " " " $= 1-r$



prob. of not having a single resetting jump in N-steps $= (1-r)^N$

$$P_r(x,N \mid x_0, 0; x_r) = \Big\{ (1-r)^N P_0(x,N \mid x_0, 0) + \sum_{n_L=1}^{N} r \,(1-r)^{N-n_L} P_0(x,N \mid x_r, n_L) \Big\} \quad (1)$$

Analytical formula



$(1-r)^{N-n_L}$

P_0 : PDF for the reset-free case. (in our case: SM/ACM RW)

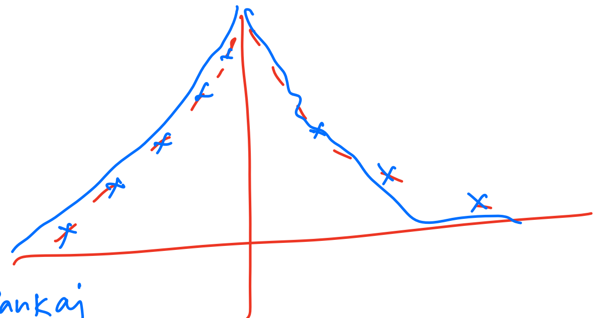
↓

Exactly Binomial

$$\langle x^m \rangle = \sum_{m=1}^{\infty} x^m \, P_r(x, N \mid x_0, 0; x_r)$$

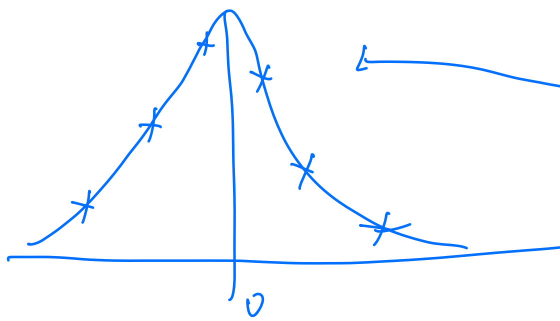
Task: $P_r(m, N)$

Goal would be to fit the simulation* vs theory (Eq. 1)



* that Pankaj already did

RW:



$p(m, N)$